Supreme Court, U. S.
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JOINT APPENDIX

IN THE

Supreme Court of the United States

OCTOBER TERM, 1975

Nos. 75-510 &
75-545

FLINT RIDGE DEVELOPMENT COMPANY,
Petitioner,

v.

THE SCENIC RIVERS ASSOCIATION OF OKLAHOMA AND THE ILLINOIS RIVER CONSERVATION COUNCIL,
Respondents.

CARLA A. HILLS, SECRETARY OF THE DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, *et al.*,
Petitioners,

v.

THE SCENIC RIVERS ASSOCIATION OF OKLAHOMA AND THE ILLINOIS RIVER CONSERVATION COUNCIL,
Respondents.

ON WRITS OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE TENTH CIRCUIT

PETITION FOR A WRIT OF CERTIORARI IN NO. 75-510 FILED OCTOBER 2, 1975

PETITION FOR A WRIT OF CERTIORARI IN NO. 75-545 FILED OCTOBER 8, 1975

CERTIORARI GRANTED DECEMBER 8, 1975

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*Not reprinted in Appendix. Citations are to appendix of Petition for Writ of Certiorari filed by Petitioner Flint Ridge Development Company. The respective pages for these items in the Petition of the Solicitor General are 1a, 16a, 18a, and 31a.

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IN THE

UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF OKLAHOMA

No. 74-131 (Civil)

THE SCENIC RIVERS ASSOCIATION OF OKLAHOMA and THE ILLINOIS RIVER CONSERVATION COUNCIL, Corporations,

Plaintiffs,

v.

JAMES T. LYNN, Secretary of Housing and Urban Development and GEORGE K. BERNSTEIN, Administrator of Interstate Land Sales, Department of Housing and Urban Development,

Defendants,

and

FLINT RIDGE DEVELOPMENT CO.,
a joint venture,

Intervening Defendant,

and

THE UNITED STATES OF AMERICA, ex rel
The Environmental Protection Agency,

Additional Defendant.

DOCKET ENTRIES

DATE	FILINGS – PROCEEDINGS
4/24/74	Verified Complaint
5/15/74	Amended Complaint

DATE	FILINGS – PROCEEDINGS
7/31/74	Hearing on Temporary Restraining Order
8/1/74	Further Hearing
8/2/74	Further Hearing
8/14/74	Second Amended Complaint
9/4/74	Findings of Fact and Conclusions of Law
9/4/74	Order, Judgment and Decree
9/6/74	Notice of Appeal

UNITED STATES DISTRICT COURT FOR THE EASTERN DISTRICT OF OKLAHOMA

[Title omitted in printing]

Transcript of Proceedings Held Before the Honorable Luther Bohanon on July 31, 1974, and August 1 and 2, 1974

* * *

[27] Q Will you state your name, address and occupation, sir?

A My name is Bill Howard. My address is 5026 West Tecumseh Road, Norman, Oklahoma, and I am the Executive Director for the Oklahoma Wildlife Federation.

Q Mr. Howard, would you give the Court, sir, a resume of your educational background and any degrees that you hold?

A Yes. I am a graduate with a BA from Washburn University in Topeka, Kansas, and I have completed studies except for the [28] final defense of my Master's thesis at Kansas State University; got an MS degree in environmental biology.

* * *

Q If you could tell the Court, please, generally now, what is the science of ecology?

A Well, I guess a thumbnail definition would be that it is the study of all living things and their relationship to the living and non-living environment around them.

Q And what is an ecosystem?

A Okay. This would be defined as communities of living things in a given area and also the non-living things in a given area. This for example would include the nutrients in the soil, nitrogen, phosphorous and so on, climatic conditions, [29] as well as the living components of the system.

Q Would it be proper to characterize an ecosystem as the sum of all the living and non-living parts that support the chain of life within a selected area?

A Yes.

* * *

Q (By Mr. Dalton) Now in this chain that we referred to, are there certain links, or how would you describe the links of that chain, if you can?

A Well, within an ecosystem there are several structural components that are of interest to the person who is studying or looking at an ecosystem.

The most basic one is what is generally referred to as producer organisms. These are generally green plants in the case of terrestrial ecosystems, through the process of photosynthesis to convert the energy of the sun and basic chemical elements and water into glucose and eventually other chemical compounds that are usable by grazing animals, for example, insects, grasshoppers, deer, cattle, and so on.

[30] A step above that, if you want to think in terms of a ladder of progression, would be a level of what is generally referred to as primary consumers. These are living organisms such as the Type I just mentioned, grasshoppers, rabbits, rodents, birds who eat seeds or fruit; in other words, living organisms that feed directly upon the producing plants in a community.

Above that would be another level called ordinarily secondary consumers, and these would be predator type creatures. The Bob White quail would eat the grasshopper, for example, and in that particular sequence of events would be a secondary consumer. At another time of year he would be a primary consumer because he is eating the seeds of the plants rather than insects.

And then there is another level above that referred to commonly as tertiary consumers, and these are generally what we consider to be the large predators, hawks, owls, animals that are generally totally predatory in nature.

Then there is another whole category within an ecosystem of living organisms and these are the decomposers. These would be the organisms such as different species of fungus, bacteria, some insects that decompose dead organic material, dead animals, leaves, fallen branches, fallen trees and this sort of thing.

* * *

[31] Q Can you tell us what would be meant by this chain being in equilibrium, or biological equilibrium or biotic balance?

A Well, part of the definition of an ecosystem is the units [32] wherein all of the living parts of the system interact, where you have exchanges of energy and nutrients, the flow of energy, the cycling of nutrients; and as time progresses, an ecosystem will go through various stages until it eventually reaches what is commonly referred to as a climax stage unless it is set back by some quote catastrophe, such as man's activities, a fire or whatever.

Well, when it reaches its climax stage, there exists a situation that is generally referred to as natural equilibrium, and this is a situation where there is a relatively stable flow of energy through the system, a relatively stable cycling of a certain amount of nutrients.

It is a very diverse community supporting many different kinds of plants and animals. There will be dominant species but the main characteristic of it is that it is diversified, and therefore it is relatively stable. I guess what that means is that it is impervious, or relatively impervious to any disruptions that can occur to it.

Now of course man can come in with a bulldozer or whatever and disrupt it severely, but in the natural order of things it is stable.

* * *

[40] JERRY OVERTON,

called as a witness on behalf of the plaintiffs, being of lawful age and having first being duly sworn, testified as follows:

DIRECT EXAMINATION

By Mr. Dalton:

Q Would you state your name, address and occupation, please, sir?

A Jerry Overton, 401 Wadsack, Apartment B, Norman, Oklahoma.

Q What is your occupation?

A I am an instructor of geography at Cameron University, presently on leave of absence at the University of Oklahoma for extended graduate work.

* * *

Q (By Mr. Dalton) Speak up a little bit, Jerry, please.

Would you give the Court, please, a resume of your educational background, including degrees that you hold or are presently working on?

A Yes, sir. Bachelor of Science degree, Oklahoma State University in Geography.

* * *

[41] A (The Witness, continuing) Bachelor of Science degree, Oklahoma State University, Physical Geography; Master of Science degree, Oklahoma State University, Physical Geography; presently working on a Ph.D., University of Oklahoma, in Physical Geography.

Q (By Mr. Dalton) Are you employed at this time?

A Yes, sir.

Q What are you doing at this time?

A Okay. I am employed at Cameron University but I am on leave of absence, at the present time I am actually just doing graduate work, actually employed, too.

Q May I ask you this, are you generally and specifically familiar with the Illinois River in Oklahoma, the Flint Ridge development along that river, and the river system itself?

A Yes, sir.

Q Have you done any studies pertaining [sic] the development on that river?

A Yes, I have.

Q What is the title of that study?

A The title is "Mid-Illinois River, Mid-Illinois Resources Assessment and Partial Statement."

Q What was the scope of that study?

[42] A There was actually two scopes. One was to assess the resources of the Illinois River Basin itself.

Q Assess them?

A Assess them, yes, sir. To see what's there; and secondly, to look into developments and compare the resources with the developments and see if there is any possible impacts.

Q And were you assisted on that study by anyone?

A Yes, I was.

Q Who was that?

A Mr. Ed Pugh.

* * *

[43] Q (By Mr. Dalton) Now will you state generally what you did in the performance of this study and assessment of the river resource, state generally what you did.

A Okay. We took all information that we could find, all reports and so forth of government agencies or private individuals, dissertations, theses, if we could find these, and synthesized them and produced a concise resource assessment of the river basin area, for a portion of the river basin area.

MR. THIEMAN: I am sorry, I can't hear.

A (The Witness, continuing) We took the various statements, reports, that we could find dealing with the mid-Illinois River Basin, and synthesized these and produced this one concise assessment of resources.

We visited the area. We talked with the people at Flint Ridge, obtained all the information we could find about the [44] Flint Ridge area, and compared these as well as other developments, I might add, along the area as well as non-developments, areas just owned, being utilized as wood land, farm land or whatever, and compared these use resources and produced a partial statement.

Q (By Mr. Dalton) As a result of your study, did you make any conclusion?

A Yes, sir, we did.

Q All right, now what conclusions did you draw as a result of this study?

A We drew several conclusions. Our primary conclusion was that not enough is really known of the area, as far as resource is concerned, that has been written in statements or whatever, to in our opinion allow development to take place.

Our conclusion then would be that an impact statement should be done, an environmental impact should be done of the area to compare the resources with any type development that might take place.

* * *

[45] A As I mentioned, our primary focus first was on the resource assessment of the area. This was our first procedure of the study.

We took each of the various main categories of resources, studied them individually. We studied first soils of the area. We found that there are actually four soil associations in the immediate environment of the Illinois River Basin; that of these four soil associations there are only two that predominate. The other two are found in only small areas,

* * *

[53] The Clarksville soils and the Boone chert formation, the upper formations, is highly susceptible to pollution.

Q I beg your pardon?

A It is highly susceptible to pollution.

Q In what form?

A Of any form, any liquid pollution in the area. It's, as I mentioned, unconsolidated, it's very shallow in places. That is, there is an impermeable layer or a layer

that would act as an impermeable layer to downflow of water, that is in some cases very shallow.

* * *

[54] Okay. The third type of resources we looked at in the [55] area was the flora, in other words, the vegetation of the area.

The vegetation is primarily oak, hickory, pine association. We found most of our material in waterfalls –

THE REPORTER: In what?

THE WITNESS: Waterfalls.

A (The Witness, continuing) And throughout this work the list of flora of the Ozark Plateau.

I mention this primarily because there is no incisive valuation of the flora resources for the northeastern part of Oklahoma and surely not for the Illinois River Basin itself.

Q (By Mr. Dalton) Let me ask you this, why should there be, is there a reason to do such a study or such a resource?

A Any time any development takes place in an area, an idea of what resources are there should be known. This is because throughout history various developments have taken place that have destroyed certain types of resources, whether it be flora, fauna, water or soil, whatever.

So a resource assessment should be done in any area that is under concentrated development.

* * *

[58] Now two aspects we believe of this development which will carry over into any other development in the area are worth mentioning. One is the septic tanks situation. There are going to be approximately three

thousand homesites in the Flint Ridge Development area.

Each of these homesites will be required to construct and use an individual septic tank for their own sewage effluent distribution. There is no provision for a connected sewage system and ultimately a sewage disposal plant in the vicinity or in connection with the Flint Ridge Development.

Now the impact, possible impact or probable impact, I'm sorry, of the septic tank situation is that the effluence from the septic tanks will flow into this Boone chert formation that I have discussed already.

Anything flowing from this tank would flow directly into the upper water tables, the upper aquifers of the Boone chert formation, which will be the Boone aquifer.

It is very shallow, as I have mentioned quite often. It will flow to the base level and be a part then of the water, ground water system in this area.

In many cases the Boone chert formation actually is a perched water table.

* * *

[59] The other problem we saw with the Flint Ridge area is the steepness of the slopes.

I'd like to have the slide.

The steepness of the slopes. Some slopes are very steep.

* * *

[60] Now it is engineeringly possible, I believe, to build stilt type houses which will be the type built here. This is also environmentally a hazard to build such houses. Any time that you denude in any way the vegetation on these slopes, they are very susceptible to

erosion. They will possibly form gullies, sheet erosion that will strip the entire area of any soil that is there.

* * *

[62] Now I think it's quite obvious that there are very steep slopes here on that side of the river.

Now the question that we really raised with our study is what impacts, what long range impacts will result from the various types of development within these types of resources.

The soil, the water, the flora, the fauna – what will be the long range impact of these?

What we have exhibited here as the impact is very, very minor. It's just beginning. No great impacts have occurred yet in the area.

* * *

[70] A (The Witness, continuing) The shot was taken from the road. This is a bar ditch alongside of the road, going down to one of the lakes in the Flint Ridge area that is now under construction.

You can see on this again the unconsolidated material, also the steepness of the slopes, where the vegetation is presently being found.

I might add that I was in the area during the rains, and on these sides where the vegetation is, water was actually squirting out of the slopes, where it would run down into the soil to an impervious layer and because of the heavy rainfall it was actually squirting out like a faucet.

* * *

[87] Q Now then, in septic tanks, have you made studies to determine how far the effluent from a septic tank follows through the soil before the effluent is purified?

A I have not made a study. I understand it varies from one [88] soil to another.

Q Well, have you made a determination with respect to the type of soil that is in Delaware County?

A No, sir, I have not.

Q You have not?

A No, sir.

Q Do you know it to be a fact that the State Health Department did, and it was based upon that recommendation that they approved the septic tanks?

A No, sir, I didn't.

Q Don't you deem that would be a relevant part of a study, that even preliminary as you made, that you should have determined yourself?

A We should have had that in our statement, yes, sir.

MR. THIEMAN: I believe that's all.

* * *

[92] Most of my socio-economic study was based on county situation profiles for each county, April, 1974.

Q Each county; which ones?

A That's Cherokee, Adair and Delaware Counties.

Q All right.

A And this was a publication of the Office of Community Affairs and Planning of the state, and that's all.

* * *

[93] We can quibble about semantics or whatever, but the human resource is very important no matter where we are; and in these counties we have a situation of extreme poverty. In one case, Adair County, forty percent of the families are below the poverty level.

Q What is the poverty level?
A Around $3,700.
Q Who establishes that?

* * *

[97] A (The Witness, continuing) All right. What I want to show here is that there is very little development, and our state has substate planning districts and departments which are responsible to the people of Oklahoma and to the people of their district, in planning and coordinating the development in their district, whatever it might be.

The small black dots are very small communities which consist of only a few homes, gasoline stations, something like that.

The red dots along the river in Oklahoma are public and [98] private access, or public or private campsites. Some are commercial sites. And just take a good look and we only have this one major area, ten thousand people approximately.

This is what we are going to do with it. This is what is intended to be done to it. The red is the Flint Ridge development.

* * *

As we can see, this one area in this development, in area, is greater than all other development in the entire basin.

If that in itself does not require some planning, some comprehensive plan with the state or whatever, I don't know what does.

* * *

[100] If people are going to be responsible, if officials are going to be responsible to the people they

represent in coordinating planning for these counties, as I say, the socio-economics are very poor for these areas.

* * *

[102] Q (By Mr. Dalton) What do you conceive to be the potential impact on socio-economic problems?

* * *

A Well, the conclusions are that we have this tremendous development and how it will be developed, who the people are

* * *

[103] A (The Witness, continuing) Okay. My conclusions outlined were: as to education, negative. One, possible increased strain on present primary and educational facilities; two, possible need for increased number of educational facilities; three, possible strain on school bus services.

Population: an over-population for the present resource space. As we can see, as it is now, Tahlequah is the largest community. If we have 3000 homes in the Flint Ridge Development with only three people per home, that will equal almost the present largest development, Tahlequah.

* * *

[104] Let me follow up. It is also possible in this type of development, possible unbalanced age distribution in the case of retirement homes for people, second homes, things like that.

Health and welfare, possible increased strain on already inadequate health and walfare [sic] facilities, as shown by these county situation profiles. Possible lower level of water quality for domestic supply, which is of a very high level in comparison with other rivers in Oklahoma.

* * *

[106] The largest town which could provide, the largest town within a few miles of the Flint Ridge Development which could provide fire and police protection and solid waste disposal is called Kansas, Oklahoma. I'm not even sure what the population is, but I would say it's around a hundred or less, very small.

[107] Government. With something like this, this would be definitely without planning. Increased burden on general administration efficiency. Increased burden on present police and fire protection. Increased taxes to meet the increased needs. That's most definite.

Possible strain on present transportation facilities.

And recreation, possible loss of potential access to the Illinois River.

Increased strain on present riverside recreational facilities. With an added 9000 people in residence or whatever it may be, that is definitely a strain on what is there because it's hard even to get a canoe now.

Decreased quality of physical environment as well as its esthetic value, a very important thing which is always thrown under the rug; but what is esthetic value, how can we get at it? Can we quantify esthetic value? I kind of doubt it because it's something that means something very special to each and every one of us, depending on what we are viewing at that particular time.

Possible loss of certain specie of fish and mammals. This would be a loss to hunters, fishermen and naturalists, and I think the American populace.

General increased hazard to the recreationist. Indeed if we have an increase in population of 9,000 in only a few years, I believe the mortgage on the Flint Ridge Development [108] is up in around 1980 or '81, something of that nature.

Possible environmental deterioration, a result in a long run decrease in tourism which is basic industry for this area.

Also, positive factor, there are positive factors. I recognize these. I am not trying to be biased.

An increased tax base. Definitely if the type of income that will be necessary to purchase these lots and to build adequate constructions on them most definitely would require a certain property tax which would increase the tax base for that area, which may increase, which may meet the needs of all these other adverse effects I talked about, but not all of them.

Possible increased employment opportunities for unskilled and skilled laborers in the construction industry, which would only be a short term benefit; and increased financial resource base due to increased sales and services, and to an increase in population which needs and demands certain goods and services.

So an overview here of positive and negative factors associated with increased residential development in the Illinois River Basin of these three counties, it can readily be seen that numerous problems are involved.

If any one person here doesn't see at least one problem involved here – well, between thirty percent and forty percent, as I said, are below the poverty level in this area.

What these people of these counties and of Oklahoma with

* * *

[141] A My name is Paul Buck. I live at 1623 North Delaware Place in Tulsa. I teach at the University of Tulsa.

* * *

[142] Q What is your major field?

A I am trained as a botanist although I teach biology.

Q And what department at the University of Tulsa are you a part of?

A In the Department of Life Sciences.

* * *

Q Would you tell the Court briefly your educational background and the degrees that you hold?

A I took my Bachelor of Science from the University of Tulsa; my Master of Science from the University of Tulsa; and [143] received my Ph.D. from the University of Oklahoma.

Q When did you receive the Ph.D.?

A 1962.

Q Are you the author of any publications, academic publications, dealing with ecology or the life sciences?

A Yes. I have published in the Oklahoma Academy of Science.

Q Would you tell the Court the names of those publications and your articles?

A One involved the ecological succession in subalpine ponds in the Rocky Mountains; another one in Proceedings of the Oklahoma Academy of Science involved plant lifts in southwestern Oklahoma.

One in the Southwestern Journal involved a study of the prairies in northeastern Oklahoma; one, in the Journal of Ecology involved a study of woodlands, forests, in southwestern Oklahoma.

Q Have you ever participated in any environmental studies?

A Yes, I have.

Q Would you tell the Court what they are?

A I co-authored an environmental impact study funded by the Corps of Engineers on Lake Tenkiller Reservoir.

* * *

[144] Q Do you belong to any professional societies, Dr. Buck?

A Yes. I belong to the Ecological Society of America, the Association for the Advancement of Science, Triple A S; the Oklahoma Academy of Science; Southwestern Naturalists, and others.

Q Are you familiar generally with the location of the Illinois River?

A Yes, I am. We take our classes over there frequently.

* * *

[145] Q Is the Illinois River in itself an ecosystem?

A Yes, it is.

Q Is it also a part of a larger ecosystem?

A Yes, the complex terrestrial ecosystem of northeastern Oklahoma, but the Illinois River –

Q Let me interrupt you. In talking about terrestrial ecosystem, I want you to explain to the Court what that is and break down the different kinds of ecosystems, like a simple ecosystem or a complex ecosystem.

A The terrestrial ecosystem is one involving land, plants and of course the animals that interact with the plants.

An aquatic ecosystem is one involving water, a marine ecosystem, salt water.

The aquatic ecosystem may be a lake, which is a standing body of water. It may be a slow moving stream, such as the Canadian, the Arkansas Rivers. It

may be a swift moving stream, such as the Illinois River.

Q What is a multi-specific ecosystem?

A A multi-specific ecosystem is a type that occurs in [146] nature in which there are many, many species involved.

The Illinois River, for example, since that's the ecosystem under discussion, has thousands of invertebrate forms, not individual species but different species. There are many, many different kinds.

There are thousands of microscopic forms there, hundreds of kinds of fish. There are many kinds of vascular plants.

Q What are vascular plants?

A A vascular plant is one that has a system for translocating fluids from one part of the plant to another.

Q Now are vascular systems like circulatory systems?

A Parallel, yes.

Q Thank you.

A A non-vascular plant is something like a moss or a liverwort.

In nature, ecosystems are multi-specific and with this multi-specificity there is a built in stability which means that we could go into a multi-specific ecosystem and selectively destroy some specie and probably not harm the ecosystem.

On the other hand, since there is a multi-specific ecosystem, there is a mono-specific one and that is the sort of thing that we, man, generate with our crop plants. We have a mono-specific ecosystem based on members of the grass family, corn, oats, wheat, rye, rice, sugar cane and so on.

Obviously in that kind of an ecosystem, a mono-specific [147] ecosystem, the destruction of one form would result in the collapse of that ecosystem.

Q What about the kind of ecosystem of which the Illinois River is a part?

A That's a, at this stage it is a multi-specific ecosystem and if we could successfully go in there and destroy one specie, diatom or alga, or invertebrate, we probably would not harm it.

Q What is a diatom?

A Diatoms are miscroscopic forms.

Q Would you spell that for the reporter, please?

A The diatom?

Q Please.

A D-i-a-t-o-m.

Q Now go ahead with your explanation.

A These are microscopic photosynthetic organisms that are capable of, I think as Mr. Howard outlined earlier, trapping sunlight and using that energy along with carbon dioxide and water to manufacture organic molecules.

These diatoms are extremely important, as Mr. Howard called them the producers, the base of the food web.

THE REPORTER: The what of the food web?

THE WITNESS: The base of the producers.

Q (By Mr. Khourie) What eats the diatom?

A Protozoans, small one-celled creatures, small intervertebrates [sic], [148] stone flies.

Q And what eats those?

A Carniverous intertebrates [sic], beetles, the larvae forms of many of our flying insects, small fish, small amphibians.

Q Are all these forms of life present in the Illinois River near the Flint Ridge Addition?

A Let me say I suspect they are. I have not studied –

Q Let me rephrase the question.

Are they present in the Illinois River as an ecosystem, a broad ecosystem?

A Yes.

Q Can you explain how a man-made development, not referring to any specific man-made development here, how a man-made development differs in order of magnitude from evolutionary changes in the ecological system?

A Mr. Howard outlined succession very briefly, indicating that there were changes toward a stable climax, which we could refer to as a multi-specific ecosystem. This is stable in a given period of time, perhaps geologic time, at least in terms of the climate.

Changes take place continuously. The Ozark uplift is breaking down. The Illinois River is cutting into the stone there. What is now a straight, rushing stream will eventually sometime in the future be a slow, meandering stream of a completely different nature. The life there, the plants and [149] the animals, can adjust to that sort of a change just as we adjust through the years.

I am not talking about us individually, but man has adjusted through the years to changes. That's evolution.

However, there is a degree in terms of how rapidly this can take place. You can't step in in any ecosystem and upset the thing and expect to turn around the next day and find the plants and animals adapted and changed to fit that, that disturbance.

Q Assuming a man-made development at approximately the place where Flint Ridge is located on that map, can you give us some views as an expert on how man-made changes would affect the plant life in the river and around the river; assume now about three thousand homes.

A All right. I see potential there for some problems. One of these problems, and it has been thrashed about here today, is the problem of over-feeding or over-fertilizing the river – effluent from septic tanks.

Should you over-fee [sic] or over-fertilize the river, there is a series of events that takes place. It has been demonstrated repeatedly experimentally and repeatedly in streams.

The whole process is called tutrophitation [sic].

THE REPORTER: Called what?

THE WITNESS: Tutrophitation, t-u-t-r-o-p-h-i-t-a-t-i-o-n.

[150] Q (By Mr. Khourie) And what is that process?

A Briefly, in this process, what happens is that the nutrient material there permits algae to, the population virtually explode. Algae, you remember, are green plants that trap sunlight, carbon dioxide and water, manufacturing food material and releasing oxygen.

At the same time they are using the oxygen, so that they are releasing more during the day than they are using.

If the population explodes beyond the critical point, at night when it is dark when they cannot carry on photosynthesis, they cannot release oxygen, they are going to use it so rapidly that they deplete the oxygen

content in the water to a point where the fish cannot get enough oxygen and they die.

The dead fish are attacked by bacteria, the thing gets out of hand as you can see very quickly.

Q What would be the ultimate result?

A The ultimate result is a lake similar to, or a body of water similar to Lake Erie at this point.

* * *

[151] Q What about the plant life along the stream and in it?

A The plant life along the Illinois?

Q Yes.

A We are going to get up on the bank.

Q Okay. We can go back down in the water.

A Upon the bank the problem there of course would be mechanical disturbance, by clearing out the areas and so on, which would of course lead to another problem, but it permits silting in, removing the plants from this silting in.

Actually a very important faction of the nutrient material, and I am talking here about organic material, food material, for a fresh water stream, comes from the land.

Much of this, leaves that fall in, twigs, squirrels that fall out of trees and so on, these things are important to a fresh water stream.

Q All right. Would a man-made development disturb that particular balance of nature?

A Yes, yes, it would, along the points where there is, of course, disruption along the river.

[152] Q Would there be both short range and long range effects?

A Yes. The short range effect, of course, assuming they cleared the land, is the possibility of course of

silting, as I suggested, and with silting in over a long enough period of time, you can completely disrupt the ecosystem.

First of all, the silt in the water intercepts the sun's rays. Green plants then can no longer carry out this process.

Q Prevents photosynthesis?

A Yes. The silt that's deposited on the bottom is going to fill in the nests the fish have built, the silt is going to cover the fish eggs. Reproduction for that time will fail.

That's why I suggest now it's going to be a longer period of time than just one event.

Many of these animals that live in a fresh water fast flowing streams have rather unique mechanism for gaseous exchange, trading carbon dioxide for oxygen the way we do in breathing.

Those mechanisms, the external gills, are covered and sealed off by silt in the water.

They can tolerate fast, fresh, clean water. They cannot tolerate silt.

* * *

[153] Do you have an opinion, based on your expertise as an ecologist, teacher of botany, life sciences, as to what effect a development of the magnitude of Flint Ridge would have upon the ecosystem of which the Illinois River is a part, the terrestrial ecosystem?

* * *

[154] THE WITNESS: Yes, your Honor. I believe that there is going to be as a result of any development of this nature a detrimental effect upon the river. This could be a short range effect, as I have

suggested here just a moment ago in terms of silting in and so on.

One of the things that concerns me is the long range effect in terms of the pressure that is going to be exerted upon the river, the recreational pressure.

The river is subjected currently to pretty severe pressure in terms of the canoe trips and so on, the large masses of people that go over there each weekend and float the river.

I am deeply concerned that transporting a large segment of the population to the river is going to tip the balance, it's going to overload it.

Our ecosystem can handle these things up to a point. Push them beyond that point and they can no longer recover.

Q (By Mr. Khourie) Would this development push that ecosystem beyond that point, in your opinion?

A Yes, I believe it would, in the long range.

* * *

[161] Q Would you state your name, address and occupation for the court record, please?

A Austin Kent Andrews, 57 South Melrose Drive, Stillwater, Oklahoma. I am Assistant Leader, Oklahoma Cooperative Fisheries Unit.

THE COURT: You are what?

THE WITNESS: Oklahoma Cooperative Fisheries Unit, Assistant Professor, School of Biological Sciences at Oklahoma State University.

* * *

[162] THE WITNESS: Fish, Pesticide and Research Laboratory, Bureau of Fisheries and Wildlife.

A (The Witness, continuing) Returned to school, Colorado State University in 1964 – 1966, excuse me,

where I completed a Natural Science degree in Fishery Science in 1968; and a Doctor of Philosophy in 1970.

Since that time I have been with the Oklahoma Cooperative Fishery Unit at Oklahoma State University where I am teaching Research and Extension in the field of fisheries. My field specialization is population dynamics and river ecology.

Q (By Mr. Dalton) You have given your experience, your background and your education and degrees and so forth. Are you familiar with the system known as the Illinois River?

A Yes, sir.

Q And specifically with the fisheries aspect of it?

A Yes, sir.

* * *

[163] Q Based upon your experience and your knowledge, your observation, your studies and your education, do you have an opinion as to environmental impact on the Illinois River, specifically the fish life, as a result of development on that river?

A I guess basically the same type of items referred to by Dr. Buck also concerns me, that when you have a system that is being affected in some way to some degree by development of any type, you are going to have effects shown through that system of that development, such as nutrient loading that he referred to, in the case of the nutrient pool; and one thing I do disagree with, that septic water, if they are operated properly, are reduced to their basic elements. These are not cleansed. They remain with the aquifer until they are uptaken by primary producers, green plants.

So this can move hundreds of miles and has been shown to move hundreds of miles.

Q These are the things that go in from septics and may move hundreds of miles?

A Right. The elemental wastes, the wastes themselves are broken down into basic elements, which travel in the aquifer if that system is working properly. If not, other things are [164] released, but assuming the system is working properly.

All right, then you do have an input, a nutrient input into the subsurface aquifer. This is going to find its way in places into the river, if not directly into the river, at least through the leader streams that work there.

All right, I don't know how much is going down. I know that any difference that you make is going to be reflected by the biota of the river.

Q By the what?

A Biota, the combination of plants and animals that we have at the waters of the river itself; and the degree of change that you will observe will be dependent on the degree of input that you have from the source.

The same is true for sedimentation. If we have ninety-two miles of roads developed within this area, as I understand may be the case, and I am not personally familiar with it – Dr. Summerfeldt, unfortunately, could not be here today – you have a very great potential if we have one of these large rains, you have a very large sediment load emptied into this river.

You have gravel bars that are then filled with sediment that will no longer provide spawning places even under ideal conditions.

* * *

[168] Q (By Mr. Dalton) In your opinion, is there a need for additional information to be developed with

respect to development on the Illinois River so we may know precisely how to modify some of the problems that are associated with this river as a result of development?

A Yes. With no more information than I understand is available at the present time, I can't make any more specific projections other than guess, as if you give me a degree I can give you a change; but at the present time I can't do much more than that without more information.

It's very badly needed if you are going to assess the impact of any type of activity on the river.

* * *

[170] A I am Bill Cox, 8124 East 16th, Tulsa, Oklahoma, and I am in water pollution control with the Tulsa City-County Health Department.

THE REPORTER: The Tulsa what?

THE WITNESS: City-County Health Department.

Q (By Mr. Dalton) Give the Court, please, a resume of your educational background, including your degrees and any degrees you are working upon.

A Okay. I have a degree from Northwestern State College in Biology, with a minor in Chemistry and Math.

I am presently conducting my Masters at Tulsa University.

* * *

[171] Q As a result of your study, have you arrived at any conclusions or opinions as to the effect of development on fish population, fish movement or behavior?

A Well, any time that we are talking about a large development – now I am not talking about small developments, but major developments, I am familiar with storm water runoff, I am familiar with sewage, since this is my line of work, and I am also familiar with fish life.

I can't help but believe that it will have a detrimental effect.

* * *

Q Do you have an opinion or do you know whether or not any species of fish that are found in the Flint Creek area that you are studying are sensitive to water quality in any way?

A Yes, sir. So far I have found five garters, which are in the persidine family, which are very sensitive to any top siltation.

* * *

[172] Q What will happen to these fish ultimately if it continues as you see it continuing?

A Okay. Fish in streams as compared to fish that are in lakes are more sensitive to any type of oxygen depletion because they are used to, since streams are shallow, they have large surface areas, they are more exposed to termperature [sic] and ambient temperatures, you know, of the environment, along with oxygen and carbon dioxide from the atmosphere, and if there [173] is any, you know, any degradation at all of oxygen they are more sensitive to any type of change like this and therefore a lot of the species, they may not disappear completely, but their numbers will be reduced.

Q If you reduce the numbers of the species of fish, do you not have impact or results back down the food chain from those fish?

A Yes, sir. We are moving from a multi-specific to a mono-specific ecosystem which is less stable.

Q Less stable?

A Yes, sir.

Q Do you feel that it would be of assistance to you in more precisely determining the impact upon the fish life, the fish behavior and the fish population, to have additional, more detailed studies concerning development in this area?

A Yes, sir, because I have had experience with developments along creeks. I have seen species, you know, just completely be removed and I think an environmental impact statement should be made before this happens.

* * *

[176] A My name is Jerry Cleveland, 7088 East 52nd Street, Tulsa, Oklahoma. I am employed by the Tulsa City-County Health Department. [177]

Q Would you please give the Court a resume of your educational background including the degrees that you hold, sir?

A I received a B.S. degree in Civil Engineering from the University of Texas at Arlington. An M.S. degree – that was a B.S. degree – an M.S. degree from Stillwater, Oklahoma State University in Civil Engineering, and a Doctor of Engineering degree from the University of Oklahoma, Norman, Oklahoma.

* * *

[178] Do you have an opinion, based on all these things, as to the potential impact which may result, air pollution, for example?

A Well, just in general terms, not referring to a particular development, any sort of activity whether it

be a point source of pollution or indirect source of pollution, which indirect sources involve automobiles, then there is some sort of analysis that needs to be made in reference to the quality of air that exists there now and what possibly might be there in the future, to meet the federal, be their quality standards.

* * *

[181] Q What are the principal components of storm water as it begins its runoff in the situation you describe?

A You mean what are the contaminants that we are talking about?

Q Yes, sir.

A We measure the storm water contaminants just like the contaminants that come from point sources to the municipal [182] treatment plant, and this would be b.o.d., biochemical oxygen demand, suspended solids, colliforms bacteria, nitrates, phosphates.

Q And what are the colliform bacteria?

A The colliform bacteria is an indicate organism which we use to indicate the presence of – if you have these organisms present they might indicate contamination.

Q Are there any other chemical contaminants that may result from storm water runoff?

A Sure. In an urban area, some of the insoluble chemical things you might be talking about would be phenols, oil and gas – this is from automobiles; things of this nature. So there are many things and types of contaminants that could reach a stream as a result of urban runoff.

* * *

[190] A Thomas D. Peace, 1604 Cambridge, Norman, Oklahoma. I am Director of the Oklahoma Department of Pollution Control.

Q Would you please give the Court a resume of your educational background and the degrees that you hold?

A I have a B.S. in Psychology from Oklahoma State, an M.A. in Public Administration from the University of Oklahoma, an M.S. in Environmental Health from the University of Oklahoma, and a Doctor of Philosophy in Environmental Health from the University of Oklahoma.

* * *

[191] Q Could you give me a description, sir, brief description so that the record could be clear and understood, of your duties and responsibilities as Director of the State Pollution Control Coordinating Board?

A Yes, sir. I am not Director of the Board. I am Director of the Department of Pollution Control, which is the administrative arm of the Board.

I attend to the administrative activities of the Pollution Control Coordinating Board, including the coordination activities of environmental agencies in Oklahoma.

Q Now, so – again, what is the State Pollution Control Coordinating Board?

A This Board was created in 1968, and through some '71 amendments by the Oklahoma Legislature, it is composed of the heads of seven state agencies and two citizens appointed by the Governor, to work in coordinating the activities of pollution, environmental agencies in Oklahoma.

* * *

[194] Q Now based upon your experience and qualifications, do you have an opinion with respect to the Illinois River, as we have talked about it, as to whether it possesses any scenic values?

A Yes, I believe it does.

Q How about any recreational value?

A Yes.

Q Any fish or wildlife values?

A Yes, it does.

Q Any historic values?

A I don't know.

Q Any other values that you might ascribe to that river?

A These are some other values. The Oklahoma Water Quality Standards, which are prepared by the Oklahoma Water Resources [195] Board and reviewed by our Board, designates certain beneficial uses for the Illinois River.

There are a number of those in the documents you have in your hand there, including public water supply, recreational use, fisheries, in some areas of the Illinois, for disposal of properly treated waste, also for cooling water for certain kinds of industrial operations.

I can't remember them off the top of my head. There's about half a dozen beneficial uses that have been designated by Oklahoma Water Quality Standards.

Q All right. I will hand you what has been marked Plaintiff's Exhibit No. 3 for identification and ask if you can identify that, tell the Court what it is, please.

A This is the "Oklahoma Water Quality Standards, 1973", published by the Oklahoma Water Resources Board.

* * *

[208] Q Would the preparation again, thoroughly done and properly done, of an environmental impact statement be of assistance in addressing yourself to the problem of non-point sources of pollution?

A Yes, it would.

* * *

Q (By Mr. Dalton) Based upon your experience, qualifications, your background, your education, your duties and responsibilities currently, your observation, do you believe that an environmental impact statement should be prepared prior to development being done along and adjacent to the Illinois River and the Illinois River Basin?

A Yes, sir.

* * *

[233] Q Would you state your name and address for the Court, please, sir?

A Thomas Aley, 1025 South Roanoke, Springfield, Missouri.

THE REPORTER: How do you spell your last name?

THE WITNESS: A-l-e-y.

Q (By Mr. Dalton) Mr. Aley, I will ask you to speak up so [234] we can all understand you, please.

What is your occupation, sir?

A I am a consulting hydrologist and Director of the Ozark Underground Laboratory.

Q All right, sir. Would you give the Court, please, a resume of your educational background and any degrees that you hold?

A I have a Bachelor of Science degree in Forestry, University of California, Berkeley; Master of Science in Forestry with emphasis in forest hydrology, University

of California, Berkeley; additional graduate work toward a Ph.D. in Geography at Berkeley; in Watershed management and Geology at the Univeristy of Arizona, Tucson; and in Geography, Geology, Southern Illinois University, Carbondale.

Q Do you have any academic experience?

A Yes. I have taught at the University of California, Berkeley; University of Arizona, Tucson; School of the Ozarks, Point Lookout, Missouri.

Q All right, sir. Do you hold any honors?

A I have a couple in honorary Forestry, fraternity awards, from when I was with the federal government, U.S. Forestry Service, for superior performance, and an award from the National Speleological –

* * *

[236] Q Have you personally visited the Illinois River on occasion?

A Yes, I have.

Q Now do you have an opinion, based upon your knowledge, your experience, your background and your observation, your [237] studies, as to whether or not development on the Illinois River, including the Flint Ridge Development, or adjacent to the Illinois River or on any of its principal tributaries, will have an effect upon or impact upon the human environment?

A Yes. My opinion is it definitely would.

Q Would you tell the Court what that opinion is, please?

A All right. I see a range of problems now occurring, potential problems which can be anticipated on several fronts.

Let me speak first to the problem of septic tanks, and their use in this type of terrain, this type of

hydrogeologic setting. That means water and the rock, the kinds of soil, the kinds of geology that we have here.

* * *

A The first problem I see relates to the use of septic tanks in this type of hydrogeologic setting. You are dealing [238] with Clarksville and associated soil series and you are dealing with soluble rocks. These are rocks that can be dissolved in sedimentary ground water.

Now many of the, like in the Reed Springs formation, you have a lot of chert in the formation. That is an insoluble rock but it is bound together by soluble rock.

Septic tanks basically are designed for use in good agricultural soils, and this is something that needs to be borne in mind; and much of the Ozarks does not consist of good agricultural soil.

The soils that we have here do not provide very good absorption of the materials introduced into them, and they don't provide effective filtration.

I say this based upon experience and based upon studies which I have done both for the U.S. Forest Service and for the Missouri Clean Water Commission.

* * *

[243] Q Now with respect to the areas we are talking about, the Illinois River Basin, what classes of materials, or what environmental problems do you foresee, potential problems as a result of septic systems for three thousand home sites?

A All right. You have the problems with pathogenic material, the bacteria and the viruses. I believe this is an important consideration. And equally – let me rephrase that.

An even more important consideration is the movement of nutrients, and particularly nitrogen.

* * *

[246] Q Now what are the effects on plant life associated with the stream as a result of the introduction of nitrogen?

A When you add nitrogen to water, you are adding fertilizer. Fertilizer helps plants grow better. That is why the water has less clarity, because there are many plants growing in it and that is what reduces the clarity of the water; so you are fertilizing the microscopic plants and you get such an abundance of them there, plus some of the macroscopic plants as well, phylomentus green algae and such as this. You lose water clarity and you get more of what people call the slime on the rock, which is largely phylomentus green algae.

So as you add nutrient to a stream, you are increasing the plant material in that stream.

Q Does the increase of plant material in the stream make any differences with respect to other forms of life in the [247] stream?

A Yes. In any ecosystem if you change one thing you change everything else in the system. That's, that is sort of a basic concept. You will move from one type of fauna, this is animal life in the stream, to another.

* * *

Now you mentioned human health problems initially. What human health problems do you perceive will result as a result [248] of the use of septic systems along the Illinois River?

A I would think that with the use of septic systems that you are going to get more bacteria and viral material moving into the river than is currently the

case, and any time you have more of this material you are increasing the human health hazard.

Many of the viruses are very long-lived things. Bacteria, some of them, are pretty long-lived as well.

As you deal with ground water conditions in the Ozarks, you find that these things can travel great distances.

* * *

[251] A One of the problems I saw when I was out there relates to sediment production.

I drove a number of miles of road out there and in my driving I noticed quite a bit of erosion along the road. According to some of the things I have seen from the developer's handout sheets, they are proposing something on the order of ninety to ninety-five miles of roads.

In all of the roads I drove, I saw no road stabilization, no grassing of the right of way, no grassing of the disturbed areas at all. Many of the road cuts are very high angle, the road fills are high angle. These produce more sediment than do lower angle cuts, lower angle fills, which are sodded.

In one place I saw some gullies that were three or four feet deep, which had formed already; a lot of sediment is being produced from the area, and ultimately it's going to appear in the Illinois River and some of it already has appeared.

During the time that I was floating on the river, we passed a hollow that came in from the development side of the [252] river. I don't know if it has a name. It was immediately downstream of a round house setting on a bluff. It was built by the developer and it shows up in some of their pictures.

This particular hollow drains quite a bit of the area where development has been taking place, and when we floated the river I noticed that vegetation on the development side of the river downstream of the confluence with this hollow was significantly muddier than was the vegetation on the nondeveloped side.

It was muddier because of the storm of about two months ago.

What this tells me is the water draining out of that hollow was carrying far more sediment than was the water flowing in the Illinois River.

Now prior to development, when that was woodland area, the vegetation should have been much cleaner on the right side than it was on the left side, but the way it was, after the development the vegetation was much muddier on the right than on the left side.

* * *

[253] Sediment can do a lot of damage to the aquatic life in a stream. One of the aquatic animals I have been involved with in work that I did for the United States Forest Service, where I did a lot of work on the Eleven Point National Scenic River.

Q Where is the Eleven Point National Scenic River?

A It's in Missouri, in Shannon and Oregon Counties.

Q Is that in the Ozarks?

A In the Ozarks, yes.

The work that I did there indicated that there is an organism in the stream that is very important, and this is the web spinning caddis fly, that's c-a-d-d-i-s fly. It is a little bug that lives in the stream and spins a web to catch its food, and its food is fiber plankton.

The web serves to knit many of the little rocks in the [254] streams together, and knits them to the

bigger rocks. If you pick up a rock out of the stream you will find a lot of little rocks attached to it.

What this animal does is maintain channel stability. He ties all the little rocks together with his webs, so the channel is very firm.

In the work I was doing in the Eleven Point Basin, we found that sediment was very destructive to this web spinning caddis fly. You can't catch your fiber plankton with a muddy net, seems to be the problem. The abrasion is very destructive.

Say there would be a road crossing. The caddis fly population would drop off significantly downsteam of it, and the channel would lose its stability and you would lose the pool and riffle nature of the stream.

What I saw in the Illinois River was – I hunted around a long time before I found many of this, before I found any of the web spinning caddis flies, but they were there; but they are not there in the kind of abundance that I am accustomed to seeing them in the higher quality streams of the Ozarks, and I think the reason they are not there is in substantial part because of sediment loads in the stream and as soon as I got in a canoe to go down the stream and pushed out and walked in the gravel, as soon as I walked across the gravel, I knew there wasn't many well sustained caddis flies where they had been, [255] something had happened – as soon as I got out on the stream, because the gravel was loose.

Q The gravel was what?

A Loose, it wasn't knit together, and any time – I got out several times to walk around in the gravel, and this is what I found all the way down.

Now I have not done extensive studies way upstream of this and I don't know what the conditions are there,

but I do know that the web spinning caddis fly is a very important organism, and I do know that he is distinctly affected by sediment.

Q Now what is the effect of changing the stability of the stream, why should we be concerned with changing stream stability?

A Well, there are several reasons we should be concerned. It is going to affect fish habitat. It is going to affect the productivity of the stream, how many fish you have. It is going to change the nature of the stream, the pool or riffle nature. An unstable stream will tend to develop uniform rage rather than pools and riffles that characterize the stream today.

It is also going to affect how much bed load material, and that's the gravel stuff on the bottom, how much bed load material is transported down the channel.

Q And if that bed load material is transported down the [256] channel, do you know where it then will go?

A The first dam.

* * *

[257] Q Now are you familiar with the preparation, general purposes of an environmental impact statement?

A Generally, yes.

Q In your opinion, would the preparation of an environmental impact statement, properly and thoroughly prepared, be of assistance in precisely determining some of the impacts as a result of sedimentation, some of the impacts on human health, [258] some of the impacts as a result of or resulting from the nutrients into the river – would that impact statement be of assistance in establishing those impacts, perhaps minimizing them, at least pointing out to the public where they are?

A Yes, it would.

Q In your opinion, should one be performed in this case?

A Yes, sir.

* * *

[260] Cross Examination by Mr. Thieman:

Q Mr. Aley, I gather by your testimony on direct examination that your tests that you have applied are tests which you yourself have made but are not generally accepted by governmental authorities as being the type of tests that prove or disprove whatever tests that you were trying to conduct?

A They are techniques which are new techniques recently developed to evaluate the effect of septic tank systems on ground water systems. You see –

* * *

Q (By Mr. Thieman) Mr. Aley, as I understood your testimony on direct examination, the test that you made of the camp trailer in the Ozarks next to the water well, that the method that you used in connection with that test to determine whether or not fluids from the septic tank were getting into the water [261] was the method that you alone had used and that you had developed, is that true?

A It is a new technique, but in addition to that I was sampling for total colliform, fecal colliform, all tests performed in accordance with the standard methods, which is the bible for water quality work. It is an acceptable, the use of Lycapodium as a tracing agent is an acceptable technique. It generally falls outside of the technical competence of most people working in the field of Public Health. It falls within the competence of my field.

* * *

Q Now then, are they especially identifiable like a human being is?

A Yes, because I developed a technique for staining them, with special purpose microbiological stains, so that they are not only spores which are not natively found in the area, but they are also stained so I can identify them; so there is no, [262] no question but what I am getting the spores, and not many people are buying Lycapodium spores and when they do buy them, they are all colorless. They are used primarily in the pharmaceutical industry.

Q Now then, is that one experiment the basis of your opinion that the septic tanks in the Flint Ridge Development will do exactly the same as the test that you conducted in the Ozarks?

* * *

A (The Witness) No, that is only one of a number of similar investigations.

Q (By Mr. Thieman) Okay. Isn't it possible with respect to the one experiment about which you have testified, that's the only one that you have told the Court about – did you actually follow the course of the water to determine whether or not there could have been an air space or a water space where the water had actually channeled itself right into their fresh water supply, which could be a unique situation in and of [263] itself?

A I believe this is the way it typically does occur. No, of course I didn't flush myself down the toilet and go through the pipe to follow it.

Q Well, then how did you without making that type of inquiry, how can you compare that situation to the soil situation at Flint Ridge?

A Very similar soils, similar hydrogeologic terrain.

Q Did you take a soil sample in the Flint Ridge area?

A I read the soil reports.

Q Did you take a soil sample?

A No.

Q Did you make any ground test borings in the Flint Ridge area?

A That is not applicable to the investigation.

Q I just asked you if you did that, please, sir.

A No.

Q Where was the exact location of this experiment that you testified?

A At Blair Tower Lookout near Doniphan, Missouri.

Q And where is Doniphan, Missouri?

A Doniphan, D-o-n-i-p-h-a-n.

Q Okay, where is that?

A Oh, it's in Southeastern Missouri in Carter County.

Q How far is that from Tahlequah, Oklahoma?

[264] A Probably two hundred and fifty miles.

Q You are telling this Court that conditions two hundred and fifty miles away from Flint Ridge is exactly the same as it is in Flint Ridge, is that right?

A No, I am not telling them that, and I said that in my direct examination. I am saying there are great similarities, and I pointed out, I believe, that no two areas are ever identical; but based upon my professional judgment, my expertise, I believe that conditions are similar enough that this case serves to illustrate the problems which can occur.

Q But you to this date have never taken a soil analysis of any of the soil on Flint Ridge property, have you?

A No, sir. I would expect to ask permission before I did anything.

Q Did anybody stop you when you were going through the Flint Ridge project?

A No.

Q Now then, you say that you are familiar with the Flint Ridge project, is that correct?

A That's right.

Q Will you tell the Court what inquiry you made with respect to Flint Ridge?

A I looked at the land.

Q You looked at the land and how long did you look at the land?

[265] A For a day.

Q For one day, and what else did you do?

A I looked at the land from the river and I looked at the river. I spent a day out in the area, part of the day driving the roads, looking at the surface through the development, and then part of the day on the river.

I read material from soils reports and any material I could get hold of. I look at state geologic maps and reviewed Masters thesis down here at Oklahoma University on the geology of the area.

Q And whose Masters thesis did you review?

A The name was Gary, I believe it's Gurlee, G-u-r-l-e-e. I could get you the complete reference. It would appear as one of the references on the bottom of the state geologic map, entry number 70, if I am correct.

Q All right. Now what other inquiries did you make with respect to the Flint Ridge Development?

A I believe that's all.

Q Did you make any inquiry with respect to the type of septic tanks to be used?

A No, I would presume –

Q I just asked you a question, yes or no.

A No.

Q Make any inquiry as to the size of the lots in Flint Ridge?

[266] A I have read the literature and I am familiar with it from –

Q Tell me the average size of a lot in Flint Ridge.

A There's 7000 acres, 3000 house sites. You can do the division there. It would be about two and a third acres per house.

Q Two and a third acres per house. Now the mobile home experiment that you made, I assume was a mobile home that is what I call a camp trailer, is that right?

A No, it wasn't a camp trailer.

Q Isn't that what you said on direct examination?

A No, it was not.

Q All right, what was it?

A It was a mobile home probably 50 or 60 feet long. It was at least half a mile from the nearest neighbors, which would mean it had a 640 acre lot.

Q I see, and the well was how far from the mobile home?

A From the mobile home or from the septic system?

Q From the mobile home.

A Probably in excess of 100 feet.

Q Now are you contending to this Court that the water supply in the Flint Ridge is going to come from water wells?

A No.

Q Is that your information?

A No.

[267] Q Now then, you are telling this Court that if you have one home to two and one-half acres, and you spread out a septic tank field over that two and a half acres, that that is going to contaminate the Illinois River?

A In this type of hydrogeologic survey, yes.

Q And how is it going to drain into the river if the drainage is away from the river?

A I have seen no evidence that indicates to me that the subsurface drainage is going to be away from the river.

Q What study have you made to determine where the subsurface drainage drains to?

A I read this Master's thesis down at O.U. on the geology.

Q So you are relying upon a thesis that somebody did at O.U. rather than your own inquiry and investigation, is that correct?

A It takes a great deal of –

Q I said, is that correct or not?

A Yes.

Q What studies have you done to determine what happens to the effluent in a septic tank system that flows through soil similar to what you are talking about in the Ozarks with respect to filtrating the water and making it again potable?

A I have done a number of studies tracing water with dyes, which are subject to high absorption to get a measure of the absorption capabilities of the subsurface, and I have done a [268] number of traces with Lycapodium spores.

Q How far does the water in the type of soil we have in the Flint Ridge project, how far does that water have to travel before it again becomes potable?

A You are talking about for drinking?

Q Uh huh.

A I cannot give you a number, and this is the problem with septic tank regulations.

Q I see. You have not arrived at a number as a result of these studies, it that correct?

A This subsurface is very variable and this is a problem you cannot get a number that is meaningful.

Q That is your opinion?

A Based on a great deal of data.

Q But that is just your opinion?

A That is my opinion.

Q And that opinion is not based upon any solid analysis of the soil in Flint Ridge?

A No, obviously.

* * *

[275] Q Would you please state your name to the Court and record?

A John Montgomery.

Q Mr. Montgomery, where are you employed?

A I am Administrator for the Office of Community Affairs [276] and Planning for the State of Oklahoma.

Q What are the duties and responsibilities of the Office of Community Affairs and Planning?

A Well, to operate and administer the Office of Community Affairs and Planning, and advise the Governor and the Legislature on problems relating to community affairs and the coordination of planning within the state of Oklahoma.

Q Now Mr. Montgomery, would you please tell the Court a little bit about your educational background?

A Well, I got a Bachelor's degree from Princeton University and a Law degree from Georgetown Law Center.

* * *

[277] Q Now on the basis of your knowledge and familiarity with the Illinois River, do you consider the river to have any unique and important scenic value to Oklahoma?

A Well, I think it does, and particularly since I work for the Legislature and they have designated it as a Scenic River, I certainly think it does.

Q Do you also perceive a recreational value from a planning [278] standpoint in the Illinois River?

A I think it's one of the primary recreation areas within the state.

Q All right. What impact is there in terms of economic value of recreational facilities from your position as a planner?

A Well, we probably, in Oklahoma the only trend that has been reversed in our population development in the last forty years has been the redevelopment of the eastern Oklahoma area, now particularly in southeastern Oklahoma, deep southeastern Oklahoma, it was Weyerhauser and northeastern Oklahoma also.

Recreation and development, the kind of development it is, is a major factor in the economic turnaround in that area. Of course, I think some of this is based on, in fact I think a lot of it is based on the fact that it is a very pleasant place to live, the clear water, adequate water, the lower prices involved as far as the cost of living. Of course I think services are increasing. That's what we are working on.

Q All right. Now of these values that you have just discussed, the scenic value, the recreational value, the

economic value, do you perceive any threat to these values by development, using the general term, along the Illinois River?

A Well, this is probably the next big issue that we face within the state. There is a threat, there is a threat there. There is a threat of strip mining, a threat in deep southeastern [280] threats?

A Well, you have a river that has been used by the natives of the area primarily recreational, from Oklahoma City and Tulsa, some from Missouri and Arkansas, and there is unlimited access.

Well, property owners access was sort of a negotiable issue, and so we have had good access along the river.

If the development is set up for four or five miles there is the issue of limited access as to where the public can get off the river and get on the river. I think some things have been brought out in the testimony. Of course any time you do have large scale development, you have the issue of erosion. This comes in because we do flood planning. We are the conduit for HUD for that, and now around the state, you know, it's not going so well.

We have these variances, but generally we try and deal with these, if we can't get a better scheme within the state for how to handle and assist local governments, we will deal with these kinds of development issues; but you know I would say again, that development has a favorable economic impact and our role is to try and get in and mitigate the problems that arise from what we consider a favorable impact.

Q What are some of the impacts that are in the nature of environmental, but are not the grass, trees type of environmental impact that will occur in this general area in Adair [281] and Delaware Counties?

A Well, you know, I am as far as getting specific on that, I think it would be speculation. It's just hard to determine. As far as development, our job is to write a development plan for Oklahoma. Any time you move toward new population, toward new economic activity, you can trace other indicators, transportation issues, education issues, sometimes those work out fine and sometimes they have an adverse effect.

Q All right. Is it your opinion, as I guess Chief Planner for the State of Oklahoma, as the Administrator of the Office of Community Affairs and Planning, that a preparation of an environmental impact statement would be beneficial to you and your agency in the performance of your duties in the planning function?

A I think it would be beneficial to our agency and I think it would be beneficial to the Flint Ridge people.

* * *

[299] Q Will you please state your name for the Court and record?

A Monty Murphy, that's M-o-n-t-y.

Q Mr. Murphy, what is your occupation?

A I am Planning Engineer for the Oklahoma Highway Department.

* * *

[300] Are you familiar with the location of the Flint Ridge Development?

A Yes, generally familiar with the location.

Q Where is it located?

A As I understand it, it's located on the south side of State Highway 33, on the east side of State Highway 10, on the west side of Flint Creek, in Delaware and Mayes Counties.

Q I am going to hand you what has been marked for identification Plaintiff's Exhibit No. 8, and ask you what these are.

A These are county maps that are prepared by the Highway Department in the Planning Division, and we use them and of course they are available for sale to anybody who wants to use them, standard county maps.

Q Are these true and correct copies of the maps on file with the Highway Department?

A Yes, they are.

* * *

[304] Q Critically inadequate. What is the rating contained in the 1972 Sufficiency Rating Report for Highway 33, the major east-west highway?

A Well, which portion of it?

Q Directly adjacent to the development.

[305] A Generally speaking, that highway rates 41 to the east of State Highway 10 and oh, 51 and 45 to the west of Highway 10, which is in the critically inadequate stage.

* * *

Q All right. Now what would be the effect increased traffic on the State Highway 33 sufficiency rating?

A The rating as I have said is compared to a standard, and the traffic dictates which standard you use, whether you build a two lane or a four lane or a freeway type of facility, so of course the higher the traffic the higher the standard would be.

Q What would happen to the sufficiency rating of Highway 33 if ten thousand people were living along that route?

A Well, if there were, for example, 10,000 additional trips on the route, it would probably call for a higher standard, which would mean that the sufficiency rating would go down and it would become more inadequate.

Q All right. Now what is the sufficiency rating of Highway 10 as it passes by the Flint Ridge Development in that segment below Highway 33 intersection?

[306] A 10 to the south has a sufficiency rating of 58.

Q What does that numerical rating, what does that numerical rating place the highway in?

A That's also in a critically inadequate range.

Q Would the same effect of increased vehicle, I think they call it VMT, vehicle miles traveled, or trips, be the same on Highway 10 as on Highway 33?

A Well, those are, that's average daily traffic, and yes, the same effect would hold true on 10 as on 33.

Q And the sufficiency rating would fall even further?

A Right.

* * *

[313] Q All right. I believe your testimony was that the impact of the development will be to further lower the sufficiency rating more in the critical area than now?

A That's right.

* * *

[316] Q Will you state your name and address for the Court, please, sir?

A Marvin W. Baker, Jr., 300 Hal Muldrow Drive, Norman, Oklahoma.

Q What is your business or profession or occupation?

A I am Associate Professor of Geography, University of Oklahoma.

* * *

[318] A (The Witness) I hold a Bachelor's degree from the University of Northern Colorado. I hold a Master's degree from the University of Northern Colorado. The Bachelor's degree was in social science and biological science; Master's degree was in geography, social science.

I have a Ph.D. from Syracuse University in geography.

* * *

[320] Q What would a geographer mean if he talks about a functional perspective?

A If we take a look at the proposed development here, I as an urban geographer – I consider that one of my chief specialties, to deal with how man uses land in an urban context, how he organizes himself in subdivisions, how he decides how to use land, how he comes into conflict when he decides a single parcel of land might have three or four alternate uses – how these things are resolved, the different value systems we bring to such a case.

If we take a look at this development, my own judgment is something along this line: We are dealing here, if we look at the map, look at this 7000 acres in the Illinois River basin as it is outlined here, we see an intrusion into the area that has historically been of slow growth, small towns, rural settlements, a rather pastoral setting in general, we are seeing an intrusion of something that is essentially urban in character.

In other words, this 7000 acres and perhaps the 14,000 acres across the river if that should be added at

a future time, and other developments as well, are essentially islands of urban type development. They are not indigenous to the functional structure of the basin as it now exists.

[321] By this I mean the kind of housing that is planned here, the layout of lots, the pricing, the appeal to an interested segment of the population is an urban oriented one. We are talking about whether in essence a middle income suburban development that is being draped across this terrain, an urban development that we might find around the fringes of Oklahoma City or Tulsa.

Q Can we consider this particular development, the Flint Ridge Development, in a vacuum, standing alone, or do we consider this development in terms of the basin as a whole?

A By professional training, geographers would rebel very much about any effort to look at a problem in a vacuum of this sort.

Personally I have long been aggrieved in cases of this sort and many others when we do try to separate a part of a problem from its surroundings, because they are tied together and I see many complications, many problems, that can be brought about by this type of development in this kind of a social and economic setting, that I don't think that many of the local officials are really prepared to deal with.

Q What alterations do you perceive actually or potentially in the, we'll say landscape of the area?

A When we talk about the landscape changes, we have had a discussion about the various pollutant conditions and I will not address that.

[322] Essentially we are talking about land in northeastern Oklahoma in this basin, land that has

never been productive agriculturally, land that is very steep in terrain, land that it is difficult to see attracting a dense population in the traditional sense, land that has high recreational possibilities.

We are draping this subdivision, with its single family plots, across this terrain and we are making the assumption then that this is somehow the collective judgment of man that this is the best and highest possible use for this particular part of the terrain.

I would submit that among the things that needs to be considered by local officials, planning agencies, the state and other parties, is what we want the Illinois River basin to be in the year 2000. We are dealing here with – and socio-economic conditions are really atrocious for the state of Oklahoma. How does this basin fit into what is essentially an urban population in this country?

And if we take a look at the map and we see, we can almost swing an arc from Tulsa through Muskogee and on east down the Arkansas River and see a large crescent of urbanizing development. This is where the population is going to be in the next twenty or thirty years. Everybody talks about it. This is where the pressure is going to be on land.

I say when we look at these northeastern uplands, and [323] that includes most of the Illinois River basin, this is our recreational reserve.

If it is to be our recreational reserve, how do we assign certain valuation for particular slopes, for particular landscape associations, for particular vegetative characteristics?

And among the most attractive areas for open space, and open space preservation, are these relatively large

blocks of steep terrain that form the escarpment of the Cookson Hills or the Cherokee Hills as some people want to call it, and the Boston Mountains.

They provide a great resource for recreational use in the future.

If I may continue, I might state here that in some ways by our development of what is essentially an urban form of land use draped across, literally draped across this rough terrain, this is precluding our option, our options to make a collective decision at a later point in time, as to how we want to use this resource, because what we are doing here is giving approval to a subdivision of these large blocks of land and saying that each of us individually, at least those that will be attracted and can afford to buy land in this type of development, these people will come and they will attempt to create their own private, quasi-private rural retreat, complete with guardhouses, blocks of land set apart for [324] the private enjoyment of those who can afford to enter.

This bothers me some as a geographer, again taking this broad perspective. I think we have to deal with the whole eastern end of our state. As the presssure for more of this kind of subdivision occurs, our opportunities for acquiring and protecting large blocks of attractive open land for the public are going to be reduced.

* * *

[325] The question was this, does a community economically benefit automatically when a developer says, "We will build so many homes in this area and you will receive so much in taxation."

[326] One study done in Barington, Illinois reveals that four bedroom homes, even $100,000 homes on

five acre tracts, would require more in public expenditures than they would provide in property taxes, while they come up here with a report that says small apartments would be more suitable.

A similar study in Palo Alto, California recommended that the city acquire substantial open area in the foothills area as permanent open space because although twenty-two alternatives for land use were considered, none of them would provide revenue to the city of Palo Alto, which is not a poverty stricken area by any means, they would not provide revenue to the city of Palo Alto equal to the costs that would be accrued to the taxpayers of the city.

I would quote here, "Even though two-thirds of each property tax dollar is paid by non-residential development in Palo Alto, it was found that $45,000 homes would have to be priced at $62,000 and $80,000 homes at $116,500, if they were to pay their own way."

A third study, in Charlottesville, Virginia, or in open country nearby, came to relatively similar conclusions, that development would exceed costs.

Now we don't have enough of these kinds of studies. I am unaware of any study in Oklahoma that weighs cost benefit ratios here.

Q Now let us assume that development proceeds in the Flint

* * *

[330] Q Does this result in any burdens on local or state government?

A It can in this sense: if a great number of lots are actually sold, the ownerships transferred thereby and they are not developed, development may be very scattered, the land may end up with a clouded title ten years, fifteen years, twenty years from now, there may

be a burden in terms of future planning that would like to recover title to this because of this subdivision, this fragmentation of land.

This has been a problem in many cities and certainly can be a problem in second home development.

Q Would you relate these perspectives to an environmental [331] impact statement; in other words, in the National Environmental Policy Act, they refer to studies dealing with relationships between local short term uses of man's environment and the maintenance and enhancement of long term productivity.

Would these types of studies and this type of information relate to that, addressing answers to those questions?

A Yes, it would.

Q Would it relate to some degree to addressing answers to questions involving irreversible, irretrievable commitment of resources?

A It most certainly would.

Q Would it relate to answering questions concerning adverse environmental effect which cannot be avoided if the proposal be implemented?

A Yes.

Q And suppose if we had the information and wished to make certain decisions, would it relate to the alternatives to the proposed action?

A It could, yes.

* * *

[338] Q Will you please state your name for the Court and the record?

A Kirk Breed.

Q Would you spell it?

A B-r-e-e-d.

Q Mr. Breed, will you state your occupation?

[339] A I am the Director of the Office of Outdoor Recreation and Planning of the Division of State Parks, State of Oklahoma.

Q Would you please tell the Court a little bit about your background, educational attainment, matters of that nature?

A I have got a Bachelor of Science degree in Ecology and Zoology from Oklahoma State University; spent ten years with the federal government in Latin America in the planning and design of national parks with the Peace Corps and with the U.S. A.I.D. Mission.

* * *

[340] Q (By Mr. Ikard) Do you perceive any cultural value to the Illinois River?

MR. THIEMAN: We will stipulate there is cultural value to the Illinois River.

MR. IKARD: I'd like to have his answer on that, your Honor, because I believe he could bring his professional

* * *

recreationist and a person involved in the planning of

* * *

[346] access to a resource you increase the number of people that are using that resource; so as an example, if there are three thousand families living in the Flint Ridge Development and they have their children and their guests visiting them every day, then that is going to increase by that particular number, whatever all of that is put together, the number of potential users on the river itself.

So therefore we have here a recreational resource with a maximum in terms of what it can use or can take care of, and that number being increased.

Q Have you formed an opinion as to whether or not Flint Ridge Development would overtax the resource?

A No, I couldn't say that.

Q Would the preparation of an environmental impact statement in proper form assist you in the formation of an opinion?

A Yes, it would.

Q Would the development of an environmental impact statement assist you in any planning function that you may have?

A By all means, yes.

* * *

[361] Q Will you please state your name for the record?

A My name is Bob Nichols.

THE COURT: What?

THE WITNESS: Bob Nichols.

THE COURT: Bob Nichols?

THE WITNESS: Yes, sir.

THE COURT: Talk loud enough so everybody can hear you, will you, please, Mr. Nichols?

THE WITNESS: All right.

Q (By Mr. Ikard) Mr. Nichols, how are you employed?

A Work for the Oklahoma Consumer Protection Agency, a division of Community Health and Preventative Medicine.

Q And what specifically kind of training do you have with regard to this, in terms of educational background and job experience?

A A graduate from Oklahoma State University, Bachelor degree in Political Science; then attended the

Oklahoma University [362] Health Sciences Center in Oklahoma City; presently doing graduate work there.

In addition, I have been employed as a consultant to Health Care Facilities in cities around the United States to make recommendations as to whether or not they should either expand their facilities or not.

I have also worked with the Legislature, the Honorable Legislature of the State of Oklahoma, in their deliberations concerning Oklahoma University Health Sciences Center; and the State of Minnesota.

Q All right. Now Mr. Nichols, make this as brief as possible. Have you done an inventory of the medical care facilities available in this area?

A Yes, sir.

Q Would you tell the Court what they are?

A In Delaware County there is a 25 bed hospital in Jay and a 25 bed hospital in Grove. These are conforming beds by both state and federal standards.

There are no long term care facilities in Delaware County.

Q What do you mean by long term care facilities?

A A long term care facility is intermediate between a nursing home and a short term care hospital.

* * *

[363] Of the ten services that hospitals are normally expected to have by the State of Oklahoma, four are available in Delaware County.

There is not, or they do not have radiation therapy, intensive cardiac care or intensive care. It's just something not available.

In Adair County and Cherokee County, in the Community General Hospital category, there are 37 existing beds in Adair County. They are not conforming by both state and federal standards.

There are 50 beds programmed as being needed, and these consist of thirteen new beds plus the 37 old non-conforming beds being replaced.

* * *

[379] By Mr. Dalton:

Q State your name and address to the Court, please, sir.

A David R. Strickland, 1509 North Main Street, Muskogee, Oklahoma.

* * *

[381] Q Did you undertake to obtain or prepare a petition drive concerning legal protection for the Illinois River?

A Yes.

Q I hand you what has been identified as Plaintiff's Exhibit No. 6 and ask you to identify that, sir.

A These are Xerox copies of original petitions which were circulated by the Illinois River Conservation Council and the Scenic Rivers Association and some of the member organizations of the Illinois River Conservation Council, to obtain signatures expressing their concern about the Illinois River; and this is copies.

Q Approximately how many names do you have on there, sir?

A 11,394, I believe.

* * *

[428] By Mr. Harris:

Q Will you please state your name to the Court?

A My name is R. LeRoy Carpenter.

Q What is your occupation, Dr. Carpenter?

A State Commissioner of Health and Chairman of the State Department of Pollution Control Coordinating Board.

Q In your capacity as State Director of the Department of Health, are you responsible for the enforcement of rules and regulations of the State Department of Health and the approval of septic tanks?

A Yes, we are.

Q I hand you what has been marked as Defendant's Exhibits [429] 1 and 2 and ask if you would identify those, please.

A Defendant's Exhibit 1 is the Oklahoma Water Pollution Control statutes that are administered by the State Department of Health, and Defendant's Exhibit 2 is the rules and regulations entitled State Department of Health Engineering Bulletin No. 600, dealing with septic tanks and subsurface tile systems.

Q Are you familiar with these rules and regulations?

A Yes, I am.

Q Yesterday, Dr. Carpenter, a witness testified, his name was Jerry Overton, that testified that waste material would run into the river as primary sewage.

Is this a true statement?

* * *

[430] Q (By Mr. Harris) Is that a true statement, Dr. Carpenter?

A In my estimation it is not a true statement, if those septic tanks are truly installed as the rules and regulations of the State Department of Health so state.

Q Where will the effluence go?

A The effluence from a septic tank?

Q Yes.

A The effluence from a well installed tank, designed and installed according to the State Health Department regulations, would go into the subsurface soil.

Q What happens when it goes into the subsurface soil?

A The various kinds of biota that were referred to by previous witnesses, very small organisms, bacteria, fungus and soil particles, would absorb the various nutrients and the so-called pollutants into the particles in the soil and the water then percolates through the subsurface soil to appropriate levels.

Q In terms of pathogenic diseases and the nitrates and phosphorous, do they have a detrimental or a beneficial effect?

A In most situations the nutrients, nitrogen, phosphorous, have a beneficial effect on the soil and the biota.

* * *

[442] Q Do you know whether or not it is either the best practical or the best available technology with respect to the Illinois River basin, the Flint Ridge area?

A In my general knowledge of the Health Department and its activities, I would say that in some areas, some specific areas in the Flint Ridge Development, in the Flint Ridge Development that the septic tank method of treating sewage would be very acceptable and the best practicable at this time.

There are other areas, most likely yet undetermined, that septic tanks would not be acceptable according to the State Health Department standards. Those have not yet been decided. They have not been tested yet.

Q So we have a situation, do we not, in which we have a lack of sufficient data or knowledge to make that decision with respect to those latter areas?

A Talking about – we have insufficient data to define any individual lot, not that we have insufficient data on the entire Flint Ridge project.

Q Can you state here today as a matter of fact, without qualification, that the use of septic tanks in the Flint Ridge area would not result in indirect pollution in the Illinois River?

A Yes, my statement is, as you recall, that if those septic tanks are installed and operated in accordance with the State [443] Board of Health rules and regulations, 1-904, as listed in that bulletin, Defendant's Exhibit 1, that it would not, those septic tanks would not result in polluting the Illinois River.

* * *

[448] By Mr. Thieman:

Q Would you state your name to the Court, please?

A John H. Armstrong.

[449] Q And where do you live, Mr. Armstrong?

A 8500 Meadow Lark Lane, Oklahoma City.

Q And what is your duty, business or profession?

A I am a Regular Professional Sanitarian in Oklahoma, employed by the State Health Department, in Environmental Health Services of the State Health Department.

Q You have brought with you certain records that the Court requested Dr. Carpenter to produce in court this morning; have you brought those records with you?

A Yes, sir, I have.

Q I hand you what has been marked as Defendant Flint Ridge's Exhibit 1 and would you identify that document, tell the Court what it is?

A This is a document, first of all, it's got a letter of transmittal on the front of it, and then the second letter is a certification that this is a true and exact copy of a percolation test on the Flint Ridge Addition, which was performed by a Registered Professional

Engineer in Oklahoma; and these are the percolation tests that we used in approving this plat, for the use of a public water supply and the use of individual sewage disposal system.

Q For the Flint Ridge project?

A For the Flint Ridge project, yes.

Q Would you explain to the Court what a percolation test is?

[450] A Well, this is a procedure that we use to determine how fast soil will absorb water, and it is used pretty uniformly throughout the United States. Most all the health departments accept this as a procedure, and the range on it is, the procedure is to dig a hole any size in diameter, anywhere from 4 to 12 inches in diameter, and fill the hole full of water, let it presoak, and then after at least four hours presoaking, put six inches of water in the bottom of it and then you time the drop of water in this hole, and this way we can determine how porous the soil is.

Of course with real tight soil, it takes more absorption range than if it's sandy soil, why it takes less; and this is standard procedure for determining what type of soil we have and whether it is acceptable for septic tanks.

Q Now was this information furnished to you by the developer of Flint Ridge prior to the time that you approved the plat?

A Yes, sir, it was.

Q For Flint Ridge?

A Yes, sir.

Q Now how many percolation tests does the record show that was made on the Flint Ridge property prior to the time that you approved it?

A I believe it was fifty. I am not sure on that. It was fifty and then we had twenty. I'd have to check the dates on [451] these, just how they fall in here. I

believe it would be a total of seventy then on the whole thing.

Q So there has actually been seventy percolation tests made on it?

A Made on it, right. I'd assert that there have been seventy percolation tests made.

Q And that's on the twenty-two hundred acres which is presently platted, is that correct?

A This is mostly – this is Delaware County where we approved Delaware County.

Q I hand you what has been identified as Defendant Flint Ridge's Exhibit 3. Would you tell the Court what that is, please, sir?

A This is just a plat of the Delaware County Flint Ridge Addition.

Q Does that show where the percolation tests were made?

A Yes, sir. It has little round symbols throughout.

Q Would you show those to the Court so that when the Court looks at the exhibit that he will know what they are?

A For example, here's No. 49 here. Here is where the engineer reports where the percolation –

THE COURT: The two dots, round dots about the size of the rubber end of a penny pencil.

THE WITNESS: There they are.

THE COURT: It's not as large as the rubber end of a [452] pencil, the ordinary pencil; just the old penny type pencil.

All right. I see it. There are two of these, are there?

* * *

Q Now then, handing you what has been marked as Defendant Flint Ridge's Exhibit No. 2, ask you to state what that is.

A This is the percolation test result for sixteen individual lots, and these sixteen individual lots have septic tanks and tile fields already installed, and this is the individual percolation tests done on each one of these lots, sheet number one, and then the next sheet will be the inspection performed by Mr. Dorwin Haggard, the County Sanitarian.

[453] Q Is Mr. Dorwin Haggard here?

A Yes, sir.

Q Now then, so that the Court will understand this, prior to the time that you approved the plat there were some fifty percolation tests made of the entire area, is that correct?

A That's right.

Q Then as I understand your testimony, based upon those percolation tests, the State Department of Health approved the Flint Ridge plat for the installation of septic tanks?

A Yes, sir. Our representative there, Mr. Dorwin Haggard, took this information and the way the engineer, Holway, put it on the map and the result of the percolation tests and he said, "Well, this is an acceptable number of percolation tests to give us an idea."

And of course we approved on the basis of the fact that we come back and do individual percolation tests, as set out here on each lot, and approve each sewer system in the development.

Q That's what I was getting at.

A Right.

Q Prior to the time that a septic tank is actually constructed upon an individual lot in the Flint Ridge subdivision, it is a requirement of the State Department of Health that at least two more percolation tests be

made of the lot to make certain that the lot itself upon which a septic tank is to be [454] located conforms to the requirements of the State Department of Health with respect to the septic tank system?

A That's right.

Q Now then, if in any given lot the percolation test would show that it did not meet the requirements of the State Department of Health, what would be done so far as your Department is concerned?

A Well, we could take for example, first of all, that the soil won't absorb one inch of water in sixty minutes, then we could not approve that lot for a sewage disposal system because the soil is just so tight that it won't absorb water fast enough, as fast as a homeowner could use it, and that would be in a case where there is real tight clay soil; and we have to turn a lot of them down on that.

And in some cases the terrain is so steep that it is impossible to even get equipment on there to, you know, dig the trenches and install them, so in cases like that we have to – they put us in a position of not being able to approve the system and have to use that lot for some other purpose.

Q So in addition to that, does the septic tank field have to be designed for the particular lot involved?

A Yes, sir.

Q And that also has to be approved by the State Department of Health?

A Right.

[455] Q And those functions are carried on through the local sanitarian?

A Right.

Q Now then, in the Defendant's Exhibit No. 2 you state that there are presently sixteen lots in the Flint

Ridge subdivision which have septic tanks installed on them.

A Yes, sir.

Q And the Defendant's Exhibit 2 are reports given to your office showing installation of the septic tanks?

A Yes, sir.

Q Mr. Armstrong, in your opinion, based on your experience, are the soil conditions which exist at the Flint Ridge project, suitable for the installation of septic tanks?

A Yes, sir. All sixteen that we have approved indicated so.

Q In your opinion, will any of the effluent from the septic tank flow into the Illinois River?

A Any of the septic tanks which we have approved, the possibility would be very, very remote. Any septic tanks that we inspect and approve, it would be very remote because we are out there on the site, we see the ground, we see the type of soil. They dig those septic holes approximately six feet deep, because the tank itself is five foot, and we can see what type of soil they are putting it into besides the percolation tests.

[456] Q In your opinion, are the soil conditions out there such as will adequately and properly filter the effluent from the septic tanks?

A Yes, sir, I believe so.

* * *

[468] By Mr. Thieman:

Q Would you state your name to the Court, please?

A Dorwin Lee Hagard.

Q And where do you live, Mr. Hagard?

A I live approximately twelve miles west of Jay, Oklahoma.

Q What is your business or profession?

[469] A I am a Registered Professional Sanitarian, employed by Delaware County Health Department, and I am a representative of the State Health Department.

Q And how long have you been with the State Department of Health?

A Eight years.

Q How long have you been in Delaware County in that capacity?

A Four years.

Q And what are the nature of your duties with respect to septic tank installations?

A We require, we require – go over the percolation tests that are required by the State Department of Health. We require percolation tests be submitted to the local office before a system can be put in, and we also do final inspection work.

Q Would you tell the Court what your final inspection work consists of?

A The final inspection work consists of checking the tank, proper size of the septic tank in relation to what was shown on the perc test.

It also would involve checking to see that the proper footage of secondary tile field was put in, and also you would be checking to see that the tile field was put in at proper depth and on grain.

Q Now then, in connection with your duties, have you [470] inspected the septic installations which have been made to date on the Flint Ridge project?

A Yes, sir, I have.

Q And how many of those have been done?

A Sixteen.

Q And did you personally supervise and inspect those installations?

A Yes, sir.

Q And did they conform to the requirements of the Oklahoma State Department of Health?

A Yes, sir.

Q I hand you Exhibit No. 2 and ask you if those are the reports that were prepared in connection with those installations that you have supervised on the Flint Ridge project?

A These were reports that were submitted to my office and approved by my office, and also the final inspection reports attached on the back that have been made on the sixteen waste systems that have been put in there.

Q Mr. Hagard, would you generally describe to the Court the soil conditions in the Flint Ridge project?

A Of these sixteen here, we had a rocky, cherty type soil. There was, I noticed on a few, some clay in some of it but generally it was a rocky type soil.

Q Now then, based on your experience of four years in Delaware County are the soil conditions in Flint Ridge that [471] you have observed thus far to date conducive for the installation of septic tanks?

A Yes, sir.

Q And in your opinion, based upon your experience, does the effluent from these septic tanks adequately filter itself as it goes into the subsoil structures?

A Yes, sir.

Q Have you ever had difficulties to your knowledge of installation of septic tanks that were made in accordance with requirements of the Oklahoma State Department of Health, of ever leaking into the Illinois River?

A No, sir.

Q In your opinion, Mr. Hagard, is there any possibility that raw sewage would ever get into the Illinois River from a septic tank installed in Flint Ridge in the manner as shown in Defendant's Exhibit No. 2?

A No, sir.

* * *

[475] By Mr. Thieman:

Q Will you state your name to the Court, please?

A William N. Holway.

Q Where do you live, Mr. Holway?

A Tulsa.

Q What is your business or profession?

A I am president of W.R. Holway & Associates, Inc., consulting engineers.

Q And what is the business of W.R. Holway & Associates, engineers?

[476] A We do consulting engineering work primarily for water supply, hydroelectric work, sewage work primarily, architecture, mechanical and so forth.

Q What is your education?

A I have a Bachelor of Science degree from the Massachusetts Institute of Technology in Civil with option in Sanitarian Hydrology.

Q Is that the Massachusetts Institute of Technology which is commonly known as M.I.T.?

A Yes, sir.

Q When did you graduate from M.I.T.?

A 1943.

Q What did you do after graduation in 1943?

A Went with the Navy for three years as a naval architect during World War II.

Q And after your Navy experience, what has been your business?

A I came back from the Navy, I joined the firm and have been with it ever since.

Q Now then, can you give the Court a resume of some of the clients and works that you and your firm have done?

A Our primary clients over the years, we have been engineers for the Grand River Dam Authority since 1938.

Q Did you have any participation in the construction and building of the Grand River Dam?

* * *

[490] Q Okay. If the average was say 1,100 to 1,200 square feet, have you figured out what the percentage of ground coverage of the lot by the home would be?

A I took a 1,200 square foot, which would be a roof on about a 1,000 square foot house, figured one on each lot, yes, sir.

Q Okay. What percentage of the total ground area would be covered by homes?

A 1.3.

Q 1.3 what?

A Percent.

Q Of the total area?

A Of the total area, Phase 1.

Q So 1.4 percent would be burdened by roads; 1.3 percent would be covered by houses?

A Yes, sir.

Q So roughly, 2.7 percent of the entire ground area would be covered by improvements?

A That's true.

Q Now then, Mr. Holway, in connection with the development, did you make studies with respect to determination of the manner of sanitary sewage disposal for the Flint Ridge project?

A Yes, we did.

[491] Q Will you tell the Court what you did in that regard?

A Well, we studied the topography. We computed what the cost of sewers would be but for, again, residential lots, we think that septic tank disposal is the best.

Q And what information, what did you do to arrive at that conclusion?

A Well, we did several things. We did confer with the State Department of Health and advised them of our planned lot size and later we made the fifty percolation tests to show the ground was generally suitable.

We tried to spread those out one for every forty acres, and presented those with our plat to the Health Department.

Q Did you make any core tests?

A We made core tests in relation to the dam.

Q How many core tests did you take?

A In Phase 1 we would have six in that area.

Q Would you tell the Court what a core test is?

A The basic thing we were looking for was formation to build a dam in, in that case. They were all water tested for tightness.

Q And how deep were these core tests?

A They went from the top of the abutment where the dam would be, to well below where the foundation is.

Q Approximately what depth was that?

A Oh, some of them were 90 to 100 feet deep.

[492] Q Did you encounter much subterranean water in this area in connection with those core tests?

A No.

Q Are you familiar with the soil conditions in the area?

A Yes, sir. We worked in this general area for all my life.

Q And would you tell the Court what are the soil conditions based upon your experience and examination, your core tests, your percolation tests and your background?

A Well, in this general area of Oklahoma, if you look hard enough you can find almost anything, but what we call the Boone chert, which is a brown-white flinty rock soil, is generally a broken, brittle rock that's bedded in clay.

Clay will run anywhere from, oh, twenty to sixty or seventy percent, depending on where you are. It's a material that makes an excellent road because it has both rock and binder in it, makes the best dam building material in the world. We have used it extensively.

So I would say that a general classification would be a clay rock soil.

It can be excavated with machinery – in this particular job, the tops of the ridges can be excavated by machinery the depth of the water line which is three feet; and when you get off of the ridges, say a hundred feet down, you have to start shooting it. It gets denser as you go down.

[493] Q What do you mean that it gets denser as you go down?

A The rock gets more solid as you go down. When you get to the bottom of the formation it is extremely solid.

Q Is this type of material conducive for filtration of septic tank effluent?

A In my opinion, I think it's about as good as you can get anywhere.

Q In this area do you find that the consistency of the conditions change rather rapidly from place to place?

A Yes, they can. You can run into where an old tree stump was that might be solid clay, which would not be suitable for a septic tank. You can run into some places that are pretty near solid rock.

Q And do these differences occur within relatively short distances?

A They can, yes, sir.

Q And within a given building site, say on a one and a half acre lot, is it possible that maybe one part of the lot would be suitable for a septic tank and maybe another part would not be?

A That's true. In fact, of some of these sixteen we had to move the field from where we first had planned it.

Q Now then–

MR. IKARD: (Interposing) Your Honor, I didn't hear the answer to that question.

[494] A (The Witness) The sixteen that Mr. Armstrong testified had already been placed, we did the percolation tests and made up the plan of those septic tank systems and we did have to move around a little in some of those lots to get a suitable spot.

Q (By Mr. Thieman) Now then, Mr. Holway, will you explain to the Court what a septic tank is and how it operates?

A A septic system is a system that first you put all of the raw sewage into a tank. The tank's function is to separate out the solid material from the liquid material.

Tanks are equipped with baffles and weirs that skim the fluid off of the top. The fluid then runs into a, what we call a tile absorption field, which consists of an 18 or 24 inch wide trench with four inch tile in it, which is ceramic tile about a foot long and four inches in diameter, and those are laid end to end for the required distance. The tops are covered with tar paper and these are laid on a bed of gravel, surrounded with gravel, in accordance with the Health Department.

Now the liquid disperses itself along that field. The average length of field in those that we have done here is somewhere around 300 feet per house, and the fluid disperses itself through the cracks in the tile, between the tile, into the rock where it is filtered, and then out into the soil.

Q Okay. What happens to the effluent as it is discharged [495] from the tank out into one of these lateral fields?

A It is dispersed into the rock that surrounds the –

Q Does any evaporating take place?

A Oh, yes.

Q How are the impurities which are in the liquid that comes out of the septic tank removed or disposed of, if they ever are?

A The nutrients, the decomposables, are absorbed by bacteria that exist in the rocks and in the soil around there.

It is the same process that we use in what we call a standard rate cycling plant that we build in cities. We spray the fluid on a rock bed, and the bacteria form on the rock bed and eat up the nutrients.

Q Now is that the reason for the gravel around the laterals?

A That's to get more dispersement, and in some soils you really won't need it, but it is to give more area for the fluid to disperse in.

Q And is the bacteria that is formed on the rocks which is located around the tile, do they consume the impurities that are in the effluent?

A Yes, they do.

Q Now then, does plant life grow above a septic tank system?

A Yes. You can tell where they are.

[496] Q And what causes that, Mr. Holway?

A That's the nitrogen and of course the amount of water that's in that area. Johnson grass, particularly, likes to grow on a septic tank field.

Q Does the plant life that is located on top of the septic tank field consume the nitrogen?

A Yes.

Q That is caused by the effluent?

A Part of it, yes, sir.

Q Now then, Mr. Holway, as a result of your background and training and experience in this area, do you have an opinion as to whether or not septic tanks built and constructed on the Flint Ridge project, in accordance with the requirements of the State Department of Health, will ever flow into the Illinois River in a harmful form?

A It is my opinion they will not.

Q Is there any possibility that raw sewage could ever flow into the Illinois River from septic tanks installed in accordance with the requirements of the State Department of Health?

A No, sir, not raw sewage, because you automatically take out the solids when it goes through the tank.

Q With respect to the home sites which may be located nearest the Illinois River, what is the distance that effluent would have to travel in order to be able even to reach the river at its nearest point?

[497] A The nearest one would have to travel 300 feet.

Q Mr. Holway, do you personally own any property in this area?

A I own a location on Grand Lake thirty miles north of here, yes, sir.

Q Are the soil conditions in that particular location the same or approximately the same as they are in the Flint Ridge project?

A It's identical formation, yes, sir.

Q Do you have a water well at that place?

A Yes, sir.

Q Do you have a septic tank?

A Yes, sir.

Q How long have you owned that property?

A They built the house, finished it in 1948.

Q Been in continuous use since that time?

A Pretty much so, yes, sir.

Q Does the water well that you have at your property furnish the water that you drink and that you use at your cabin?

A Yes.

Q Do you test that water?

A Yes, occasionally.

Q How far is the well from the septic tank?

A Oh, I'd estimate 300 feet.

Q How often do you have your well checked?

[498] A Usually in a drought time when it's down. It does have quite a bit of mineral in the well water. We get a little worried about that; we have it checked.

Q Have you ever, since 1948, ever as a result of the tests that you have made in that well of water, ever discovered any of the nutrients or adverse effect from your septic tank?

A No, sir.

Q What do you attribute that to, Mr. Holway?

A I don't think there's any way that the effluent from the septic tank can get into the well, except after it has been well treated, if at all. I doubt if it goes in at all.

* * *

[500] Q But methods have been taken and will be taken to control that as soon as the roads are built, is that right?

A Yes, sir.

Q Mr. Holway, did the State Department of Health approve the plat of Flint Ridge No. 1?

A Yes, sir.

Q And that was a requirement of the laws of the State of Oklahoma?

A Yes, has to be signed by the County Sanitarian.

Q They have to approve the sanitary sewage dispoal system?

A That's true.

Q That's the reason for the plat?

A Yes, sir.

Q And that was done?

A Yes, sir.

* * *

Q Mr. Holway, you testified to extensive studies that you have made and extensive plans that you have engaged in on behalf of the Flint Ridge Development.

In that regard, I'd like to ask you, have you received any federal monies for these services that you have provided for Flint Ridge Development?

[501] A No, sir.

Q Additionally, has the Office of Interstate Land Sales in any way told you how to plan this development?

A No, sir, they have not.

* * *

Q Mr. Holway, as I understand your testimony, you are here today to tell the Court about the plat and generally the sewage system and some of the road construction work, the general plan, is that correct?

A That's correct.

Q As I understand your testimony, you are not offering any opinion one way or another concerning any peripheral development outside of Flint Ridge?

A No, sir.

Q Any effect that it may have on surrounding communities, the effect it may have on school systems in the area?

A No, sir.

Q Health facilities in the area?

A No, sir.

Q The road facilities in the area outside this development?

A No, sir.

Q I take it your testimony is not directed to any impact [502] with respect to the fish life or wildlife habitat or anything like that?

* * *

[503] Q There is a colored map, I believe.

Now refer to your map up here, which is Exhibit 4. The area that comprises Flint Ridge 1 is what, a little darker shaded in proportion; right?

A Yes, sir.

Q And about what portion of the total area that is defined as the Flint Ridge area is that?

A The total shown on that map is 7,069 acres, of which the platted is 2,035, and so it's a little less than a third.

Q Are there going to be roads in the balance of the approximately 5,000 acres?

A Yes, if it is developed as we have developed the other. This is not – we have made a master plan and done some platting, rough platting in this area. Of course it's not fixed. We assume it will be.

SUPREME COURT OF THE UNITED STATES

No. 75-510

Flint Ridge Development Company,

Petitioner,

v.

The Scenic Rivers Association of Oklahoma, et al.

ORDER ALLOWING CERTIORARI. Filed December 8, 1975

The petition herein for a writ of certiorari to the United States Court of Appeals for the Tenth Circuit is granted. The case is consolidated with No. 75-545 and a total of one hour is allotted for oral argument.

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